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Patent Application for:

TELEVISION PROGRAMMING WITH VARIABLE
ANCILLARY INFORMATION

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7 **TELEVISION PROGRAMMING WITH VARIABLE**
8 **ANCILLARY INFORMATION**
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11 **FIELD OF THE INVENTION**

12 This invention relates generally to the field of interactive television. More
13 particularly, this invention relates to a method and apparatus for providing television
14 programming with variable ancillary information.

15
16 **BACKGROUND OF THE INVENTION**

17 Television set-top boxes were initially introduced to provide tuning
18 capabilities for cable and satellite television systems. While these devices still
19 provide that fundamental function, the latest generation of digital set-top boxes now
20 often incorporate powerful computers. With such computers available, and with
21 the low cost necessitated by the high volume production of such devices, it is now
22 possible to expand the usefulness of the television set-top box beyond that of
23 merely providing tuning functions for cable and satellite systems.

24 The television program "Pop-Up Videos" was recently introduced in which
25 music videos are presented with commentary overlaid thereon. Such information
26 is presented to the viewer in the form of windows or bubbles that overlay the screen
27 image and contain text about, for example, the artist or the music being presented
28 to the viewer. This programming is believed to be created by editing a copy of the

1 original video content to superimpose the windows or bubbles of information at
2 appropriate locations.

3 This popular program is widely enjoyed by viewers wishing to find out
4 additional information about an artist or musical selection. Moreover, it provides
5 an avenue to inexpensively reuse entertainment content while providing the viewer
6 with a new product. In many instances, the additional ancillary information overlaid
7 upon the original video may be of greater interest to the viewer than the original
8 video, and thus, may attract viewers who are uninterested in the pure video itself.
9 Unfortunately, while the viewer may be interested in the initial viewing of a video,
10 or the initial viewing of the modified video with pop-up information overlaid thereon,
11 the viewer is likely to be subjected to either or both of the videos repeatedly. The
12 viewer may thus become weary of viewing the same video or ancillary information
13 repeatedly. The present invention is intended to address this issue in an invention
14 that can be widely adapted to music videos as well as conventional television
15 programming and pay-per view programming.

16 17 **SUMMARY OF THE INVENTION**

18 The present invention relates generally to interactive television. Objects,
19 advantages and features of the invention will become apparent to those skilled in
20 the art upon consideration of the following detailed description of the invention.

21 In one embodiment of the present invention, a method and apparatus for
22 presenting variable pop-up windows of ancillary information in television
23 programming is provided. Multiple instances of ancillary information is transmitted
24 to a set-top box in association with segments of programming content. The set-top
25 box selects a different set of ancillary information for display in a pop-up window
26 whenever the content is presented. In one embodiment, a different set of ancillary
27 information is presented according to the number of times the programming is
28 presented. In another embodiment, ancillary information is selected using a
29 randomizing algorithm.

1 A method of presenting entertainment program material consistent with an
2 embodiment of the invention includes: presenting a first presentation of a segment
3 of programming having a first window overlaying the segment of programming, the
4 first window containing a first segment of ancillary information relevant to the
5 segment of programming; and presenting a second presentation of the segment
6 of programming having a second window overlaying the segment of programming,
7 the second window containing a second segment of ancillary information relevant
8 to the segment of programming.

9 A method of presenting entertainment program material consistent with
10 another embodiment of the invention includes the unordered process of: presenting
11 a first presentation of a segment of programming having a first window overlaying
12 the segment of programming, the first window containing a first segment of
13 ancillary information relevant to the segment of programming; and presenting a
14 second presentation of the segment of programming having no second window
15 overlaying the segment of programming.

16 A method of presenting entertainment program material according to another
17 embodiment includes: presenting a first presentation of a segment of programming
18 having a static window overlaying the segment of programming, the static window
19 containing a static segment of ancillary information relevant to the segment of
20 programming; and presenting a second presentation of the segment of
21 programming having a second window overlaying the segment of programming, the
22 second window containing a variable segment of ancillary information relevant to
23 the segment of programming.

24 A television set-top box consistent with certain embodiments includes a
25 receiver for receiving signals representing segments of programming and signals
26 representing a plurality of segments of ancillary information, and delivering the
27 signals representing segments of programming to a display interface. A central
28 processor is programmed to carry out a process of delivering a first presentation
29 of a segment of programming having a first window overlaying the segment of
30 programming to the display interface, the first window containing a first segment

1 of ancillary information relevant to the segment of programming; and delivering a
2 second presentation of the segment of programming having a second window
3 overlaying the segment of programming to the display interface, the second
4 window containing a second segment of ancillary information relevant to the
5 segment of programming.

6 A television set-top box consistent with another embodiment of the invention
7 includes a receiver for receiving signals representing segments of programming
8 and signals representing a plurality of segments of ancillary information, and
9 delivering the signals representing segments of programming to a display interface.
10 A central processor is programmed to deliver a first presentation of a segment of
11 programming having a first window overlaying the segment of programming to the
12 display interface, the first window containing a first segment of ancillary information
13 relevant to the segment of programming; and deliver a second presentation of the
14 segment of programming having no second window overlaying the segment of
15 programming to the display interface.

16 In yet another embodiment of a television set-top box consistent with the
17 invention, a receiver for receives signals representing segments of programming
18 and signals representing a plurality of segments of ancillary information, and
19 delivering the signals representing segments of programming to a display interface.
20 A central processor is programmed to deliver a first presentation of a segment of
21 programming having a static window overlaying the segment of programming to the
22 display interface, the static window containing a static segment of ancillary
23 information relevant to the segment of programming; and deliver a second
24 presentation of the segment of programming having a second window overlaying
25 the segment of programming to the display interface, the second window
26 containing a variable segment of ancillary information relevant to the segment of
27 programming.

28 In another embodiment, a storage medium storing instructions which, when
29 executed on a programmed processor, carry out a method of presenting
30 entertainment program material including presenting a first presentation of a

1 segment of programming having a first window overlaying the segment of
2 programming, the first window containing a first segment of ancillary information
3 relevant to the segment of programming; and presenting a second presentation of
4 the segment of programming having a second window overlaying the segment of
5 programming, the second window containing a second segment of ancillary
6 information relevant to the segment of programming.

7 In another embodiment, a storage medium storing instructions which, when
8 executed on a programmed processor, carry out a method of presenting
9 entertainment program material, including the unordered process of: presenting a
10 first presentation of a segment of programming having a first window overlaying the
11 segment of programming, the first window containing a first segment of ancillary
12 information relevant to the segment of programming; and presenting a second
13 presentation of the segment of programming having no second window overlaying
14 the segment of programming.

15 In another embodiment, a storage medium storing instructions which, when
16 executed on a programmed processor, carry out a method of presenting
17 entertainment program material including presenting a first presentation of a
18 segment of programming having a static window overlaying the segment of
19 programming, the static window containing a static segment of ancillary
20 information relevant to the segment of programming; and presenting a second
21 presentation of the segment of programming having a second window overlaying
22 the segment of programming, the second window containing a variable segment
23 of ancillary information relevant to the segment of programming.

24 The above summaries are intended to illustrate exemplary embodiments of
25 the invention, which will be best understood in conjunction with the detailed
26 description to follow, and are not intended to limit the scope of the appended
27 claims.
28

BRIEF DESCRIPTION OF THE DRAWINGS

The features of the invention believed to be novel are set forth with particularity in the appended claims. The invention itself however, both as to organization and method of operation, together with objects and advantages thereof, may be best understood by reference to the following detailed description of the invention, which describes certain exemplary embodiments of the invention, taken in conjunction with the accompanying drawings in which:

FIGURE 1 is a system block diagram of a system using a set-top box.

FIGURE 2 is a functional block diagram of a digital set-top box suitable for use with the present invention.

FIGURE 3 depicts an exemplary screen image with a first pop-up window containing ancillary information.

FIGURE 4 depicts an exemplary screen image with a second pop-up window containing ancillary information.

FIGURE 5 depicts an exemplary screen image with a third pop-up window containing ancillary information.

FIGURE 6 depicts an exemplary screen image with a fourth pop-up window containing ancillary information.

FIGURE 7 is a flow chart describing a first embodiment of the present invention.

FIGURE 8 is a flow chart describing a second embodiment of the present invention.

DETAILED DESCRIPTION OF THE INVENTION

While this invention is susceptible of embodiment in many different forms, there is shown in the drawings and will herein be described in detail specific embodiments, with the understanding that the present disclosure is to be considered as an example of the principles of the invention and not intended to limit

1 the invention to the specific embodiments shown and described. In the description
2 below, like reference numerals are used to describe the same, similar or
3 corresponding parts in the several views of the drawings.

4 Referring to **FIGURE 1**, a block diagram for an exemplary interactive cable
5 or satellite television (TV) system 100 is shown. The system 100 includes, at a
6 head end of the service provider 10, a media server 12 for providing, on demand,
7 movies and other programming obtained from a media database 14. The media
8 server 12 might also provide additional content such as interviews with the actors,
9 games, advertisements, available merchandise, associated Web pages, interactive
10 games and other related content. The system 100 also includes an electronic
11 programming guide (EPG) server 16 and a program listing database 18 for
12 generating an EPG. Set-top box 22 can generally provide for bidirectional
13 communication over a transmission medium 20 in the case of a cable STB 22. In
14 other embodiments, bidirectional communication can be effected using
15 asymmetrical communication techniques possibly using dual communication
16 media -- one for the uplink and one for the downlink. In any event, the STB 22 can
17 have its own Universal Resource Locator (URL) or IP address or other unique
18 identifier assigned thereto to provide for addressability by the head end and users
19 of the Internet.

20 The media server 12 and EPG server 16 are operatively coupled by
21 transmission medium 20 to a set-top box (STB) 22. The transmission medium 20
22 may include, for example, a conventional coaxial cable network, a fiber optic cable
23 network, telephone system, twisted pair, a satellite communication system, a radio
24 frequency (RF) system, a microwave system, other wireless systems, a
25 combination of wired and wireless systems or any of a variety of known electronic
26 transmission mediums. In the case of a cable television network, transmission
27 medium 20 is commonly realized at the subscriber's premises as a coaxial cable
28 that is connected to a suitable cable connector at the rear panel of the STB 22. In
29 the case of a Direct Satellite System (DSS), the STB 22 is often referred to as an
30 Integrated Receiver Decoder (IRD). In the case of a DSS system, the transmission

1 medium is a satellite transmission at an appropriate microwave band. Such
2 transmissions are typically received by a satellite dish antenna with an integral Low
3 Noise Block (LNB) that serves as a down-converter to convert the signal to a lower
4 frequency for processing by the STB 22.

5 The exemplary system 100 further includes a TV 24, such as a digital
6 television, having a display 26 for displaying programming, an EPG, etc. The STB
7 22 may be coupled to the TV 24 and various other audio/visual devices 26 (such as
8 audio systems, Personal Video Recorders (PVRs), Video Tape Recorders (VTRs),
9 Video Cassette Recorders (VCRs) and the like), storage devices (e.g., hard disc
10 drives) and Internet Appliances 28 (such as email devices, home appliances,
11 storage devices, network devices, and other Internet Enabled Appliances) by an
12 appropriate interface 30, which can be any suitable analog or digital interface. In
13 one embodiment, interface 30 conforms to an interface standard such as the
14 Institute of Electrical and Electronics Engineers (IEEE) 1394 standard, but could
15 also be wholly or partially supported by a DVI interface (Digital Visual Interface -
16 Digital Display Working Group, www.ddwg.org) or other suitable interface.

17 The STB 22 may include a central processing unit (CPU) such as a
18 microprocessor and memory such as Random Access Memory (RAM), Read Only
19 Memory (ROM), flash memory, mass storage such as a hard disc drive, floppy disc
20 drive, optical disc drive or may accommodate other electronic storage media, etc.

21 Such memory and storage media is suitable for storing data as well as instructions
22 for programmed processes for execution on the CPU, as will be discussed later.
23 Information and programs stored on the electronic storage media or memory may
24 also be transported over any suitable transmission medium such as that illustrated
25 as 20. STB 22 may include circuitry suitable for audio decoding and processing,
26 the decoding of video data compressed in accordance with a compression
27 standard such as the Motion Pictures Experts Group (MPEG) standard and other
28 processing to form a controller or central hub. Alternatively, components of the
29 STB 22 may be incorporated into the TV 24 itself, thus eliminating the STB 22.

1 Further, a computer having a tuner device and modem may be equivalently
2 substituted for the TV 24 and STB 22.

3 By way of example, the STB 22 may be coupled to devices such as a
4 personal computer, video cassette recorder, camcorder, digital camera, personal
5 digital assistant and other audio/visual or Internet related devices. In addition, a
6 data transport architecture, such as that set forth by an industry group which
7 includes Sony Corporation and known as the Home Audio-Video Interoperability
8 (HAVi) architecture may be utilized to enable interoperability among devices on a
9 network regardless of the manufacturer of the device. This forms a home network
10 system wherein electronic devices and Internet appliances are compatible with
11 each other. The STB 22 runs an operating system suitable for a home network
12 system such as Sony Corporation's AperiOS™ real time operating system. Other
13 operating systems could also be used.

14 The STB 22 includes an infrared (IR) receiver 34 for receiving IR signals from
15 an input device such as remote control 36. Alternatively, it is noted that many other
16 control communication methods may be utilized besides IR, such as wired or
17 wireless radio frequency, etc. In addition, it can be readily appreciated that the
18 input device 36 may be any device suitable for controlling the STB 22 such as a
19 remote control, personal digital assistant, laptop computer, keyboard or computer
20 mouse. In addition, an input device in the form of a control panel located on the TV
21 24 or the STB 22 can be provided.

22 The STB 22 may also be coupled to an independent service provider (ISP)
23 host 38 by a suitable connection including dial-up connections, DSL (Digital
24 Subscriber Line) or the same transmission medium 20 described above (e.g., using
25 a cable modem) to, thus, provide access to services and content from the ISP and
26 the Internet. The ISP host 38 provides various content to the user that is obtained
27 from a content database 42. STB 22 may also be used as an Internet access
28 device to obtain information and content from remote servers such as remote
29 server 48 via the Internet 44 using host 38 operating as an Internet portal, for
30 example. In certain satellite STB environments, the data can be downloaded at

1 very high speed from a satellite link, with asymmetrical upload speed from the set-
2 top box provided via a dial-up or DSL connection.

3 While the arrangement illustrated in **FIGURE 1** shows a plurality of servers
4 and databases depicted as independent devices, any one or more of the servers
5 can operate as server software residing on a single computer. Moreover, although
6 not explicitly illustrated, the servers may operate in a coordinated manner under
7 centralized or distributed control to provide multiple services as a Multiple Service
8 Operator (MSO) in a known manner. Additionally, the services provided by the
9 servers shown in **FIGURE 1** may actually reside in other locations, but from the
10 perspective of the user of STB 22, the service provider 10 serves as a portal to the
11 services shown. Those skilled in the art will appreciate that the illustration of
12 **FIGURE 1** represents a simplified depiction of a cable system configuration shown
13 simply as service provider 10. The actual configuration of the service provider's
14 equipment is more likely to follow a configuration defined by the CableLabs
15 OpenCable™ specification. The simplified illustration shown is intended to simplify
16 the discussion of the service provider 10's operation without unnecessarily
17 burdening the discussion with architectural details that will be evident to those
18 skilled in the art. Those details can be found in the publicly available CableLabs
19 OpenCable™ specification or in the text "OpenCable Architecture (Fundamentals)"
20 by Michael Adams, Cisco Press, Nov. 1999.

21 Referring now to **FIGURE 2**, a typical system configuration for a digital set-
22 top box 22 is illustrated. In this exemplary set-top box, the transmission medium
23 20, such as a coaxial cable, is coupled by a suitable interface through a diplexer
24 102 to a tuner 104. Tuner 104 may, for example, include a broadcast in-band tuner
25 for receiving content, an out-of-band (OOB) tuner for receiving data transmissions.
26 A return path through diplexer 102 provides an OOB return path for outbound data
27 (destined for example for the head end). A separate tuner (not shown) may be
28 provided to receive conventional RF broadcast television channels. Modulated
29 information formatted, for example, as MPEG-2 information is then demodulated

1 at a demodulator 106. The demodulated information at the output of demodulator
2 106 is provided to a demultiplexer and descrambler circuit 110 where the
3 information is separated into discrete channels of programming. The programming
4 is divided into packets, each packet bearing an identifier called a Packet ID (PID)
5 that identifies the packet as containing a particular type of data (e.g., audio, video,
6 data). The demodulator and descrambler circuit 110 also decrypts encrypted
7 information in accordance with a decryption algorithm to prevent unauthorized
8 access to programming content, for example.

9 Audio packets from the demultiplexer 110 (those identified with an audio
10 PID) are decrypted and forwarded to an audio decoder 114 where they may be
11 converted to analog audio to drive a speaker system (e.g., stereo or home theater
12 multiple channel audio systems) or other audio system 116 (e.g., stereo or home
13 theater multiple channel amplifier and speaker systems) or may simply provide
14 decoded audio out at 118. Video packets from the demultiplexer 110 (those
15 identified with a video PID) are decrypted and forwarded to a video decoder 122.
16 In a similar manner, data packets from the demultiplexer 110 (those identified with
17 a data PID) are decrypted and forwarded to a data decoder 126.

18 Decoded data packets from data decoder 126 are sent to the set-top box's
19 computer system via the system bus 130. A central processing unit (CPU) 132 can
20 thus access the decoded data from data decoder 126 via the system bus 130.
21 Video data decoded by video decoder 122 is passed to a graphics processor 136,
22 which is a computer optimized to processes graphics information rapidly. Graphics
23 processor 136 is particularly useful in processing graphics intensive data
24 associated with Internet browsing, gaming and multimedia applications such as
25 those associated with MHEG (Multimedia and Hypermedia information coding
26 Experts Group) set-top box applications. It should be noted, however, that the
27 function of graphics processor 136 may be unnecessary in some set-top box
28 designs having lower capabilities, and the function of the graphics processor 136
29 may be handled by the CPU 132 in some applications where the decoded video is
30 passed directly from the demultiplexer 110 to a video encoder. Graphics processor

1 136 is also coupled to the system bus 130 and operates under the control of CPU
2 132.

3 Many set-top boxes such as STB 22 may incorporate a smart card reader
4 140 for communicating with a so called "smart card," often serving as a Conditional
5 Access Module (CAM). The CAM typically includes a central processor unit (CPU)
6 of its own along with associated RAM and ROM memory. Smart card reader 140
7 is used to couple the system bus of STB 22 to the smart card serving as a CAM
8 (not shown). Such smart card based CAMs are conventionally utilized for
9 authentication of the user and authentication of transactions carried out by the user
10 as well as authorization of services and storage of authorized cryptography keys.
11 For example, the CAM can be used to provide the key for decoding incoming
12 cryptographic data for content that the CAM determines the user is authorized to
13 receive.

14 STB 22 can operate in a bidirectional communication mode so that data and
15 other information can be transmitted not only from the system's head end to the
16 end user, or from a service provider to the end user of the STB 22, but also, from
17 the end user upstream using an out-of-band channel. In one embodiment, such
18 data passes through the system bus 130 to a modulator 144 through the diplexer
19 102 and out through the transmission medium 20. This capability is used to
20 provide a mechanism for the STB 22 and/or its user to send information to the head
21 end (e.g., service requests or changes, registration information, etc.) as well as to
22 provide fast outbound communication with the Internet or other services provided
23 at the head end to the end user.

24 Set-top box 22 may include any of a plurality of I/O (Input/Output) interfaces
25 represented by I/O interfaces 146 that permit interconnection of I/O devices to the
26 set-top box 22. By way of example, and not limitation, a serial RS-232 port 150 can
27 be provided to enable interconnection to any suitable serial device supported by the
28 STB 22's internal software. Similarly, communication with appropriately compatible
29 devices can be provided via an Ethernet port 152, a USB (Universal Serial Bus) port
30 154, an IEEE 1394 (so-called firewire™ or i-link™) or IEEE 1394 wide port 156, S-

1 video port 158 or infrared port 160. Such interfaces can be utilized to interconnect
2 the STB 22 with any of a variety of accessory devices such as storage devices,
3 audio / visual devices 26, gaming devices (not shown), Internet Appliances 28, etc.

4 I/O interfaces 146 can include a modem (be it dial-up, cable, DSL or other
5 technology modem) having a modem port 162 to facilitate high speed or alternative
6 access to the Internet or other data communication functions. In one preferred
7 embodiment, modem port 162 is that of a DOCSIS (Data Over Cable System
8 Interface Specification) cable modem to facilitate high speed network access over
9 a cable system, and port 162 is appropriately coupled to the transmission medium
10 embodied as a coaxial cable. Thus, the STB 22 can carry out bidirectional
11 communication via the DOCSIS cable modem with the STB 22 being identified by
12 a unique IP address. The DOCSIS specification is publically available.

13 A PS/2 or other keyboard / mouse / joystick interface such as 164 can be
14 provided to permit ease of data entry to the STB 22. Such inputs provide the user
15 with the ability to easily enter data and/or navigate using pointing devices. Pointing
16 devices such as a mouse or joystick may be used in gaming applications.

17 Of course, STB 22 also may incorporate basic video outputs 166 that can be
18 used for direct connection to a television set such as 24 instead of (or in addition
19 to) an IEEE 1394 connection such as that illustrated as 30. In one embodiment,
20 Video output 166 can provide composite video formatted as NTSC (National
21 Television System Committee) video. In some embodiments, the video output 166
22 can be provided by a direct connection to the graphics processor 136 or the
23 demultiplexer / descrambler 110 rather than passing through the system bus 130
24 as illustrated in the exemplary block diagram. S-Video signals from output 158 can
25 be similarly provided without passing through the system bus 130 if desired in other
26 embodiments.

27 The infrared port 160 can be embodied as an infrared receiver 34 as
28 illustrated in **FIGURE 1**, to receive commands from an infrared remote control 36,
29 infrared keyboard or other infrared control device. Although not explicitly shown,
30 front panel controls may be used in some embodiments to directly control the

1 operation of the STB 22 through a front panel control interface as one of interfaces
2 146. Selected interfaces such as those described above and others can be
3 provided in STB 22 in various combinations as required or desired.

4 STB 22 will more commonly, as time goes on, include a disc drive interface
5 170 and disc drive mass storage 172 for user storage of content and data as well
6 as providing storage of programs operating on CPU 132. STB 22 may also include
7 floppy disc drives, CD ROM drives, CD R/W drives, DVD drives, etc. CPU 132, in
8 order to operate as a computer, is coupled through the system bus 130 (or through
9 a multiple bus architecture) to memory 176. Memory 178 may include a
10 combination any suitable memory technology including Random Access Memory
11 (RAM), Read Only Memory (ROM), Flash memory, Electrically Erasable
12 Programmable Read Only Memory (EEPROM), etc.

13 While the above exemplary system including STB 22 is illustrative of the
14 basic components of a digital set-top box suitable for use with the present
15 invention, the architecture shown should not be considered limiting since many
16 variations of the hardware configuration are possible without departing from the
17 present invention. The present invention could, for example, also be implemented
18 in more advanced architectures such as that disclosed in U.S. Patent Application
19 Serial No. 09/473,625, filed Dec. 29, 1999, Docket No. SONY-50N3508 entitled
20 "Improved Internet Set-Top Box Having and In-Band Tuner and Cable Modem" to
21 Jun Maruo and Atsushi Kagami. This application describes a set-top box using a
22 multiple bus architecture with a high level of encryption between components for
23 added security. This application is hereby incorporated by reference as though
24 disclosed fully herein.

25 In general, during operation of the STB 22, an appropriate operating
26 system 180 such as, for example, Sony Corporation's AperiOS™ real time operating
27 system is loaded into, or is permanently stored in, active memory along with the
28 appropriate drivers for communication with the various interfaces. In other
29 embodiments, other operating systems such as Microsoft Corporation's Windows
30 CE™ could be used without departing from the present invention. Along with the

1 operating system and associated drivers, the STB 22 usually operates using
2 browser software 182 in active memory or may permanently reside in ROM,
3 EEPROM or Flash memory, for example. The browser software 182 typically
4 operates as the mechanism for viewing not only web pages on the Internet, but
5 also serves as the mechanism for viewing an Electronic Program Guide (EPG)
6 formatted as an HTML document. The browser 182 can also provide the
7 mechanism for viewing normal programming (wherein normal programming is
8 viewed as an HTML video window - often occupying the entire area of screen 26).

9 STB software architectures vary depending upon the operating system.
10 However, in general, all such architectures generally include, at the lowest layer,
11 various hardware interface layers. Next is an operating system layer as previously
12 described. The software architectures of modern STB have generally evolved to
13 include a next layer referred to as "middleware." Such middleware permits
14 applications to run on multiple platforms with little regard for the actual operating
15 system in place. Middleware standards are still evolving at this writing, but are
16 commonly based upon Javascript and HTML (hypertext Markup Language) virtual
17 machines. At the top layer is the application layer where user applications and the
18 like reside (e.g., browsing, email, EPG, Video On Demand (VOD), rich multimedia
19 applications, pay per view, etc.). The current invention can be utilized with any
20 suitable set-top box software and hardware architecture.

21 In accordance with the present invention, a pop-up window is used to carry
22 ancillary information associated with television programming. This ancillary
23 information can be encoded within the television signal in any suitable manner. For
24 example, the information can be encoded within the vertical or horizontal blanking
25 intervals in one embodiment, and in another embodiment, the information can be
26 encoded using any of the current or emerging standards for embedding information
27 into a digital television information stream without limitation. The terms "window"
28 and "pop-up window" as used herein are intended to embrace areas of the
29 television screen which are overlaid with rectangles, bubbles, ovals or other shapes
30 containing textual or graphical information.

1 In various advanced television proposals, such as the ATVEF (Advanced
2 TeleVision Enhancement Forum) proposal, it is possible to embed information
3 such as Internet addresses and other ancillary information within a television
4 signal. Such ancillary information can be decoded at the television set and used
5 for various purposes. Additionally, a technique for providing such information is
6 now available and in use by Wink Communications of Alameda, CA to embed
7 ancillary information into "Wink™ Enabled" television programming. Techniques
8 such as these can be utilized to provide the viewer's set-top box with the ancillary
9 information used in accordance with the present invention.

10 In accordance with the present invention, the viewer is presented with pop-
11 up windows during viewing of a television program. The ancillary information
12 contained within the pop-up windows changes in any of a plurality of ways
13 depending upon the algorithm selected for implementation. Those skilled in the art
14 will recognize many possible algorithms that are suitable for implementing the
15 present invention, with the constraint that the user is presented with varying content
16 within pop-up windows whenever the program is viewed. The term program is
17 used loosely herein to represent any television content such as a conventional
18 program, movie, pay-per-view event or even segments of a program (e.g. as in
19 music videos making up a program of a collection of such music videos).

20 An example of the present invention is illustrated in the simulated screen
21 images of **FIGURES 3-6**. In each of these images, the program content (in this
22 example a music video portraying a jazz saxophone player) remains the same. But,
23 each time the video is viewed, the pop-up window displays a different segment of
24 ancillary information. In **FIGURE 3**, the screen image 300 portrays the performer
25 at a particular time in the program with pop-up window 310 providing a segment of
26 ancillary information regarding his sequence of hits. In **FIGURE 4**, the screen
27 image 400 portrays the performer at the same particular time in the program with
28 pop-up window 410 providing a segment of ancillary information regarding his
29 experience in playing the saxophone. In **FIGURE 5**, the screen image 500 portrays

1 the performer at the same particular time in the program with pop-up window 510
2 providing a segment of ancillary information regarding his other musical skills
3 besides saxophone. Finally, in **FIGURE 6**, the screen image 600 portrays the
4 performer, again at the same particular time in the program, with pop-up window
5 610 providing a segment of ancillary information regarding his wife's musical
6 career. While four examples are shown, this should not be considered limiting.

7 As illustrated, the same segment of video can be used to trigger a different
8 set of ancillary information to be displayed to a viewer on different viewings of the
9 program material. In this example, not only is the ancillary information appearing
10 in the window varied, but the location of the window and shape of the window is
11 also varied to further enhance the interest level. In other embodiments, the shape,
12 size and location of the window can be static or can be varied along with the
13 varying of the ancillary information, as desired in implementation. In this example
14 also, the ancillary information always appears at the same location in the program,
15 but this too is not to be limiting. Information can be randomly or systematically
16 displayed in a manner that varies from viewing to viewing without departing from
17 the invention.

18 In order to accomplish this, the ancillary information in the preferred
19 embodiment is transmitted to the set-top box using any suitable technique and
20 stored in local storage (e.g. the disc drive 172 or memory 176) for later retrieval and
21 merging with the programming content during playback. This transmission can be
22 carried out prior to the programming or during the programming. In accordance
23 with one embodiment, when a marker is reached in the video signal, the set-top
24 box processor 132, under program control, places the ancillary information in a
25 window that it then overlays on the program information by superimposing the
26 window over the video information in a known manner and delivers the combined
27 information (programming segment plus window containing ancillary information)
28 it to the display interface (e.g. 156 or 166). (In other embodiments, the ancillary
29 information may include insertion times or frames for the insertion of the window.)

1 The marker may include various information used by the programmed
2 processor 132 to insert the proper pop-up window on the screen. For example, the
3 marker may include a popup location identifier that uniquely identifies a location in
4 the program so that the marker can be matched with a suitable pop-up window of
5 ancillary information. The marker may also determine the size and location of the
6 pop-up window, or this can be otherwise determined.

7 Upon reaching a pop-up marker in the video stream, the programmed
8 processor 132 retrieves a suitable segment of ancillary information for insertion into
9 the video stream. In accordance with one illustrative embodiment, the programmed
10 processor looks up the already received ancillary information in a table stored on
11 the disc drive 172. The table may contain information similar to that of **TABLE 1**.
12 **TABLE 1** below illustrates a portion of the table containing information relating to
13 the pop-up windows illustrated in **FIGURES 3-6** shown previously. In this example,
14 the pop-up window is located in location number 8 in the programming segment.
15 A plurality of segments of ancillary information is illustrated including segments 1,
16 2, 3 and 4 corresponding to 310, 410, 510 and 510 of **FIGURES 3-6**. Additionally,
17 in this embodiment, **TABLE 1** includes a time duration for display of the ancillary
18 information. In other embodiments, this can be represented by an ending frame
19 number. In still other embodiments, a video marker is not used at all. Instead,
20 **TABLE 1** would contain a starting frame number and an ending frame number or
21 a starting run time and an ending run time that would determine when the ancillary
22 information is presented to the viewer, as will be described later.

POP-UP LOCATION IDENTIFIER	POP-UP SEGMENT IDENTIFIER	DURATION OF POP-UP	ANCILLARY INFORMATION IN POP-UP WINDOW
...
7	...	...	...
8	1	8.0 seconds	BOB HAS HAD FOUR CONSECUTIVE NUMBER ONE HITS ON THE JAZZ CHARTS SINCE HIS DEBUT IN 1998
8	2	7.5 seconds	BOB HAD ONLY BEEN PLAYING SAX FOR THREE YEARS WHEN HE SIGNED HIS FIRST RECORD DEAL!
8	3	6.0 seconds	BOB ALSO PLAYS CLARINET, CELLO, PIANO AND HARMONICA
8	4	7.5 seconds	BOB'S WIFE JULIE PLAYS VIOLIN ON HIS THIRD ALBUM AN IS NOW TOURING WITH HIM
8	...	...	...
9	...	...	...
...

TABLE 1

The above information presented in **TABLE 1**, is intended to be illustrative of the type of information transmitted as the ancillary data and should not be considered limiting. The ancillary data could also include information determining the location and shape of the window, starting frame number, ending frame number and/or other information without departing from the invention.

1 Referring now to **FIGURE 7**, an embodiment of the present invention is
2 illustrated as process 700 starting at 704. At 708, the programming is received
3 including embedded ancillary information. At this point, it is assumed that the
4 needed ancillary information has been received by the set-top box 22 in advance
5 of the time it should be displayed. At 712, the programming content is started and
6 played until the appropriate time for a pop-up window containing an ancillary
7 information segment is reached at 718. This can be determined by receiving a
8 marker in the segment of programming as illustrated in **TABLE 1** (or alternatively
9 by reaching a frame number or run time corresponding to an appropriate time for
10 the pop-up window to appear). When the appropriate time is reached for a pop-up
11 window to be displayed at 718, the programmed processor randomly selects from
12 the available pop-up ancillary information segments available for presentation at
13 this time at 724 (e.g. any of the segments associated with a given pop-up location
14 identifier or pop-up start time or frame). This ancillary information is then overlaid
15 on the programming segment at 730 for a predetermined period of time. This
16 process repeats until the end of the programming segment is reached at 734 and
17 the process ends at 740.

18 Referring now to **FIGURE 8** in conjunction with **TABLE 2** below, another
19 embodiment of the present invention is illustrated as process 800 starting at 804.
20 In this embodiment, the ancillary information is arranged in sets of data, but those
21 skilled in the art will appreciate that **TABLE 2** contains equivalent information to
22 that of **TABLE 1** except it is presented in a different arrangement for ease of
23 understanding and to illustrate another technique for starting and stopping the pop-
24 up window. At 808, the receipt of the program content at the set-top box starts
25 including information such as that in **TABLE 2** representing multiple sets of
26 ancillary data (set 1, set 2, ... etc.). In this example, the set-top box records the
27 number of times a particular programming segment has been previously viewed.
28 This can be tracked by creating an identifier for each relevant programming
29 segment and storing this information in a database in disc drive 172, for example.

1 At 812, the set-top box determines the nature of the programming segment being
2 viewed and determines how many times the segment has been viewed previously
3 (N). The programming commences play at 818 until time for a pop-up window of
4 information as determined, in this example, by a frame number for a digital
5 television image being displayed at 822. By way of example, if frame number
6 123,456 has been reached and this is the 5th time this programming segment has
7 been viewed (i.e. N=5), the pop-up window 510 of **FIGURE 5** is displayed in
8 accordance with the entry points of TABLE 2 defined by the frame number and N.

9 Thus, at 828, the appropriate ancillary information segment is selected for
10 presentation in the pop-up window at 832 until the end frame number (in this
11 example, 123,636) is reached. This process continues until the end of the
12 programming is reached at 836. At this point, the counter N is incremented in the
13 database by the programmed processor 132 at 840 and the process ends at 844.
14 Of course those skilled in the art will appreciate that many variations are possible
15 without departing from the invention. For example, the counter can be incremented
16 at another location or the start and stop time can be varied. Moreover, the size,
17 shape and location of the pop-up window can be varied (either by reference to data
18 in the table, or by random creation of the window by processor 132 or server 12, for
19 example) without departing from the invention.

20 Note that one variation of the present embodiment is illustrated at frame
21 123,456 for set number 6. In this variation, which could be represented in many
22 ways including a total lack of information associated with frame 123,456, no
23 ancillary information is provided. In this manner, not only can the content of the
24 pop-up window be varied, the windows can apparently appear at different places
25 in each presentation of the segment of programming. That is, for example, a given
26 segment of programming might include 30 pop-up windows. But, 90 pop-up
27 window locations can be defined with only 30 used in any given presentation of the
28 segment of programming with hundreds of segments of ancillary information stored
29 and available for viewing. In this manner, not only is the viewer presented with

1 different ancillary information each time the segment of programming is viewed, but
2 additionally, the pop-up windows appear in unpredictable locations each time.

3 While the processes of **FIGURES 7** and **8** have been described in terms of
4 a system in which the ancillary information segments are selected for display at
5 STB 22 using programmed processor 132, this should not be considered limiting.
6 In another embodiment, either process, or similar processes, can be carried out at
7 the service provider or other program broadcaster. In such embodiments, for
8 example, media server 12 of service provider 10 includes the ancillary information
9 along with the programming content in database 14. A programmed processor
10 within media server 12 then merges the ancillary information into appropriate pop-
11 up windows in accordance with any suitable random or systematic algorithm, and
12 the merged information is then broadcast to the subscribers' STBs. The process
13 can be carried out as a batch job or dynamically as the broadcast occurs. In the
14 case of the process using multiple sets of ancillary data, a new set can be selected
15 for each broadcast rather than for each reception as previously described. Many
16 variations will occur to those skilled in the art without departing from the invention.
17

POP-UP SET IDENTIFIER	START FRAME NUMBER	END FRAME NUMBER	ANCILLARY INFORMATION IN POP-UP WINDOW
...
2	...	...	...
...
3	123,456	123,696	BOB HAS HAD FOUR CONSECUTIVE NUMBER ONE HITS ON THE JAZZ CHARTS SINCE HIS DEBUT IN 1998
...
4	123,456	123,681	BOB HAD ONLY BEEN PLAYING SAX FOR THREE YEARS WHEN HE SIGNED HIS FIRST RECORD DEAL!
...
5	123,456	123,636	BOB ALSO PLAYS CLARINET, CELLO, PIANO AND HARMONICA
...
6	123,456	123,456	...
...
7	123,456	123,681	BOB'S WIFE JULIE PLAYS VIOLIN ON HIS THIRD ALBUM AN IS NOW TOURING WITH HIM
...

TABLE 2

The marker based system discussed previously is illustrated in the diagram of **FIGURE 9**. In this process, a stream of video contains video portions 904 and pop-up window markers 910. Upon encountering a marker at 910, the

1 programmed processor 132 or media server 12 selects a segment of ancillary
2 information at 920 using any appropriate algorithm suitable for varying the content
3 of the pop-up windows for the viewer. The processor then modifies the video
4 stream by inserting the pop-up window to produce the modified stream at 930
5 containing the video signal with the window overlaid thereon. Marker 910 may be
6 removed from the resultant video stream in some embodiments. This video stream
7 930 can then be processed and viewed in the normal manner.

8 In another variation of the invention, the sequence of programming can
9 include default pop-up windows that are static (i.e. remain the same on each
10 presentation of the segment of programmed content). The variable ancillary
11 information can then be overlaid on top of the default pop-up windows. Using this
12 embodiment, viewers without a set-top box capable of presenting varying pop-up
13 windows in accord with the present invention can still present the programming
14 content with static pop-up windows. Additionally, broadcasters and service can
15 present the segment of programming without variable pop-up windows if desired
16 or in the event of a system malfunction, or if they lack the capability of presenting
17 the variable pop-up windows of the present invention.

18 Thus, in accordance with embodiments of the invention, the ancillary
19 information, location of pop-up window on the screen, shape of the window, size
20 of the window, etc. can be varied to present essentially a new viewing experience
21 each time a viewer wishes to view a particular programming segment.

22 Those skilled in the art will recognize that the present invention has been
23 described in terms of exemplary embodiments based upon use of a programmed
24 processor. However, the invention should not be so limited, since the present
25 invention could be implemented using hardware component equivalents such as
26 special purpose hardware and/or dedicated processors which are equivalents to
27 the invention as described and claimed. Similarly, general purpose computers,
28 microprocessor based computers, micro-controllers, optical computers, analog
29 computers, dedicated processors and/or dedicated hard wired logic may be used
30 to construct alternative equivalent embodiments of the present invention.

1 Those skilled in the art will appreciate that the program steps used to
2 implement the embodiments described above can be implemented using disc
3 storage as well as other forms of storage including Read Only Memory (ROM)
4 devices, Random Access Memory (RAM) devices; optical storage elements,
5 magnetic storage elements, magneto-optical storage elements, flash memory, core
6 memory and/or other equivalent storage technologies without departing from the
7 present invention. Such alternative storage devices should be considered
8 equivalents.

9 The present invention is preferably implemented using a programmed
10 processor executing programming instructions that are broadly described above in
11 flow chart form and can be stored on an electronic storage medium. However,
12 those skilled in the art will appreciate that the processes described above can be
13 implemented in any number of variations and in many suitable programming
14 languages without departing from the present invention. For example, the order of
15 certain operations carried out can often be varied, and additional operations can be
16 added without departing from the invention. Error trapping can be added and/or
17 enhanced and variations can be made in user interface and information
18 presentation without departing from the present invention. Such variations are
19 contemplated and considered equivalent.

20 While the invention has been described in conjunction with specific
21 embodiments, it is evident that many alternatives, modifications, permutations and
22 variations will become apparent to those skilled in the art in light of the foregoing
23 description. Accordingly, it is intended that the present invention embrace all such
24 alternatives, modifications and variations as fall within the scope of the appended
25 claims.

26 What is claimed is:
27